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Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

VOL. XXVI, No. 8 MARCH 1961

Growth Through Agricultural Progress

"The abundance of wildlife does not result from jurisdiction, sportsmen's meetings, or bureaucratic dictates; it results from what we do with the land."
—EDWARD H. GRAHAM

CONTENTS

PAGE

171 Wildlife Conservation
By Donald A. Williams

172 Wildlife Farming in Oregon
By Henry J. Pavelek

174 Not Worth the Taxes
By Allen G. Mayville

175 Strip Mine Becomes Wildlife Haven
By Ernest Dierks

177 1,500 Cattle and 100,000 Deer
By Ellis F. Sedgley and Harold M. Boeker

179 Trout Pond in Virginia
By Wayne M. Hypes

180 Fish Are Soil Survey "Customers"
By Bernhard A. Roth

182 Beaver Pond Grows Duck Food
By Luther E. Gowder

183 Hunting on the Contour
By John Nehoda

184 Range and Wildlife Management
By Robert O. Koerner

186 New Home for Ducks
By Wayne A. Ruona

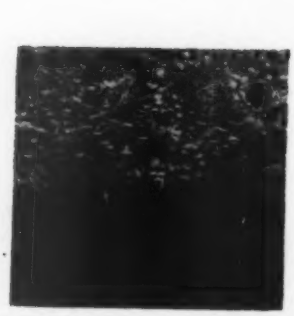
187 Pheasants—By the Hundreds
By Howard V. Cheney

188 More Quail and Deer
By Joe Coughran

189 Catfish Farming
By Brice M. Latham

190 Cottontails and Bobwhites
By Dalton Rushing and R. D. Fisher

191 Book Reviews



COVER PICTURE.—Raccoon emerging from woodland undergrowth to grass meadow.

Soil Conservation

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TOM DALE, Editor

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Wildlife Conservation

In the Soil and Water Conservation Program

By Donald A. Williams

Wildlife, as we know it in the United States, is largely an agricultural crop. Like other agricultural crops, its welfare and production rest mainly in the hands of farmers and ranchers. More than half our land area is in farms and ranches and is used primarily for the production of food, fiber, and wood products. But these lands also produce most of the wildlife that we hunt, watch, or otherwise enjoy.

Rabbits, quail, doves, and pheasants make the bulk of the hunter's bag and are commonly referred to as "farm game" because they are found and hunted on farmlands. Squirrels, grouse, and turkeys are farm game too, as are great numbers of deer and antelope. Many wild ducks nest on the farm wetlands of our northern States and winter on the grainfields, pastures, and marshes of farms in the South. Other birds and mammals, including songbirds and furbearers, occur in their greatest numbers on farms and ranches. Farm ponds and reservoirs are favored and productive fishing spots.

Our present abundance of agricultural wildlife is due in a large part to our soil and water conservation program. Up until a quarter-century ago, clean cultivation, careless burning, overgrazing, and other exploitive methods of farming and ranching were not only causing great damage to our soil resources, but also were depriving wildlife of habitat essential to its existence. In many parts of the country, hunting and fishing were becoming progressively poorer. But in the 1930's, the development of conservation farming brought revolutionary changes in agricultural practices and halted the decline of farm wildlife.

Conservation farming and ranching benefit wildlife in many ways. Contour farming, stripcropping, and terracing bring a variety of cover conditions; crop rotations, stubble mulching, and mechanized harvesting provide food; grassed waterways, living fences, and protected streambanks furnish travel lanes; and ponds and reservoirs provide new bodies of water for fish, waterfowl, and other wildlife.

Some of these conservation practices are evident to everyone—stripcropping, contour farming, and farm ponds have become standard features of our rural landscape. But wildlife is benefited by measures that are less apparent. One of these is the operation of the land capability system of classifying soils as to their suitability for agricultural use. In adjusting their land use to the capabilities of their soils, farmers retain in an undisturbed, natural condition many parcels of wildlife land that might otherwise be destroyed by attempts at cultivation. Prime examples of such areas are wetlands of high value to wildlife but with soils not suitable for cultivation. Before the use of the land capability system, thousands of acres of such wetlands were drained for cropland. They were soon found unprofitable for cultivated crops and were abandoned; but their wildlife values had been destroyed. Conservation farming retains this kind of wetland for use by ducks, muskrats, and other wildlife.

The Soil Conservation Service recognizes that fish and wildlife are agricultural crops and considers the planned production of fish and wildlife to be a kind of land use normal to farms and ranches. While conservation farming in itself benefits wildlife in most fields, many land users wish to take specific measures to increase wildlife production. Since its establishment the Service, in providing facts to farmers and ranchers to help them make decisions as to how they will use and treat their lands, has provided specialized technical assistance in the conservation, development, and utilization of land and water areas for the production of fish or wildlife as either a principal or secondary crop.

In fact, the stated policies and objectives of the Soil Conservation Service, in respect to fish and wildlife, are:

1. To acquaint land users with the value and importance of fish, game, and other wildlife.

2. To make croplands, grazing lands, woodlands, and farm and ranch waters produce secondary crops of fish and wildlife consistent with other uses of such lands and waters.

3. To obtain crops of fish and wildlife on land and water areas used specifically for such purposes.

4. To safeguard the habitat of valued wildlife and to offset or reduce damage to such habitat resulting from changes in land use or installation of soil and water conservation measures.

Wildlife Farming in Oregon

By Henry J. Pavelek

WILDLIFE farming" may be a new term to many sportsmen and wildlife enthusiasts, but not so in western Oregon. It is going "great guns" there and its results are well known throughout the area.

Mr. Gerald Falk, of Harrisburg, is a good example. He brought waterfowl and pheasants to his farm by creating a favorable habitat for these forms of wildlife through "wildlife farming."

Note:—The author is area conservationist, Soil Conservation Service, Albany, Oreg.

To accomplish this he diverted 60 acres of his 169-acre farm from the production of surplus farm crops to the production of crops specifically for wildlife. Fourteen of the 60 acres were used in developing 7 shallow waterfowl ponds. The entire area surrounding the ponds is planted to alternate strips of corn, sudangrass, grain, and buckwheat in the spring.

Six of the ponds are planted during the spring to sudangrass or buckwheat. These ponds are flooded in the fall as desired, during waterfowl migration. The other pond was made a permanent water area by using drainage water in the winter and irrigation water in the summer. Water plants such as smartweeds, bullrushes, spikerushes, and wild millets were either planted or allowed to increase naturally in this permanent pond. It serves as a nesting area for a few mallards and blue-winged teal. Needless to say, the hunting on Falk's farm is superb.

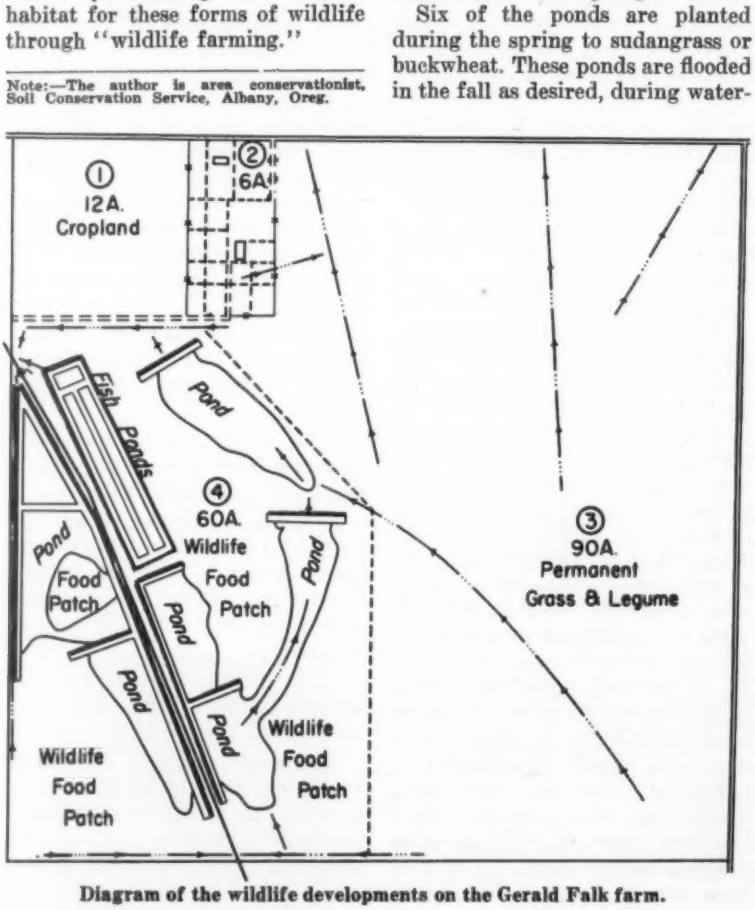

Diagram of the wildlife developments on the Gerald Falk farm.

On Mr. Bethel Vernon's farm in the Linn-Lane Soil Conservation District, there was an 8-acre natural wildlife area which included some seasonal ponded water and wildlife food plants. Prior to development, the waterfowl count was nearly zero. The ring-necked pheasant population of the area was estimated in 1957 to be one bird per 200 acres. In 1958, the year following development, the waterfowl count was over 25,000. The pheasant population rose to 70 birds per 200 acres. The California Valley quail increased from 3 coveys to 10 coveys.

Mr. Vernon's developments were similar to those of Falk, except that the plantings surrounding the pond were planted in blocks rather than strips. For the past 3 years 200 acres of his 335-acre farm has been farmed for wildlife. He and his friends have enjoyed some fabulous hunting as a direct result of these developments.

We all can well remember the tremendous boost in yields that has taken place with agricultural crops in recent years. Not too long ago in western Oregon, for example, it was not uncommon for dairy

farmers to stock their pastures at the rate of one cow to 2 or 3 acres. Under modern conservation farming methods with irrigation, however, these same pastures now produce sufficient forage to graze three cows per acre during the grazing season.

And so it is with the production of game birds, waterfowl, and other wildlife on land which is "farmed" for this purpose. The results from many of the "wildlife farming" developments are spectacular.

Waterfowl developments in western Oregon SCD's generally are of two types. One type of development consists of a permanent water area with natural food and cover. The permanent water areas are principally designed as nesting areas for mallards and other ducks which breed locally.

The other type of installation is a controlled water area designed principally to attract and hold migrating waterfowl by food plantings. The secret to this installation is food and water control. The ponds can be drained in the spring to plant them and the adjacent area to high-producing food plants. As the crop matures in the fall, it is flooded to attract waterfowl.

Grain in the form of wheat or barley is planted as an early-season food crop. Sudangrass and buckwheat, which do not mold or spoil as rapidly as grain, are used for a midseason food. Corn, with the husk protecting the kernels from the elements, is planted as a late-season crop. Usually grain, sudangrass or buckwheat, and corn are planted in alternate strips. The strips of lower-growing solid-stand crops provide semi-open water landing areas for the waterfowl.

Another typical example of wildlife farming is that of the 517-acre Lee Brothers farm in the Benton Soil Conservation District. In 1959 a concrete flashboard dam and earth dike were constructed to form a 5-acre shallow pond area. A 34-acre wildlife food planting of corn and sudangrass was made around the pond.

Water control structure on the Lee Brothers farm.

This is in a locality where there were no ducks in the immediate area during the past 8 years. Toward the end of the 1959 season over 1,000 ducks began using this area. The pheasant population has doubled and there has been a small increase in quail. Pigeons and doves have also increased as a result of a small spring development. It required only one year to achieve these spectacular results. The excellent hunting enjoyed by the Lee brothers and their friends has been an ample reward for their endeavors.

Hunters on the shore of a waterfowl development on the Bethel Vernon farm.

Many other similar examples of productive wildlife farming exist in western Oregon. Some of the farmers have taken advantage of the Soil Bank Program to assist them in making these developments; others have done it on their own.

Gerald Falk, the Lee Brothers, Bethel Vernon, and other wildlife farmers have found that management of their shooting is as important as management of their land for wildlife. As true sportsmen, these men observe strict hunting rules based on sound conservation principles. They take some and leave some for seed. As a general rule, the farmers and their city friends hunt the areas not more than two or three times a week. They have found that such light hunting pressure does not drive the game from the local area.

◆

The Fish and Wildlife Service is using funds from the sale of the 1960-61 migratory bird hunting stamp to acquire and preserve waterfowl wetlands, including pothole areas in the northern United States.

NOT WORTH THE TAXES

By Allen G. Mayville

Aerial view of the Danyow marsh area, with Otter Creek at the left.

"LAND like that isn't worth the taxes paid on it." That's the way most people felt about several hundred acres of land near the mouth of Otter Creek in Addison County, Vermont. Their attitude is easy to understand.

The land was only a few inches above the creek level at low water stage. During the spring, it was flooded five or six feet deep by run-off from the 700,000-acre watershed of the creek. Lake Champlain, just a few miles downstream, rose and held the water on it for six weeks or more. By summer, the water receded and disappeared from the surface. All that grew on the land were cattails and buttonbush.

Soil scientists of the Soil Conservation Service mapped it as fresh water marsh. No it wasn't of much use to a dairy farmer—just one more thing he had to pay taxes on.

Note:—The author is work unit conservationist, Soil Conservation Service, Middlebury, Vt.

Most farmers have no use for marsh and swampland. They can pasture the land around the edges, but cattle are likely to get mired if they venture out into it.

But to Orville Danyow, who owned 150 acres of it adjoining his 375-acre dairy farm, it seemed to have possibilities.

Orville liked to hunt, trap, and fish; and his three boys, ranging in age from 12 to 18, shared this pleasure. They shared the work on the farm, too.

The problem was that when duck-hunting season was on, the swamp was dry; there were no ducks. Muskrats couldn't use the marsh much, either, because it was not flooded long enough for them to build dens and get around for food.

Orville pondered the problem and then bought another 100 acres. This gave him control of 250 acres of marsh, bordered on one side by the higher land of his farm and on the other by Otter Creek.

Otter Creek, between Lake Champlain and the falls at Vergennes, eight miles upstream, is used today mainly by fishermen and pleasure boats; but before the days of power boats and railroads, it was an important part of the transportation system in Vermont.

Sailboats and barges regularly plied the Lake between Burlington,

Orville Danyow and son checking traps in part of their 250-acre marsh.

Vt., and Whitehall, N.Y., and through canals to the Hudson River and New York City to the south and to the Richelieu and St. Lawrence Rivers in Canada. The Otter was an important link in this transportation system. (Back in 1814, a fleet of gunboats was built at Vergennes and sailed out through Otter Creek to defeat a British flotilla on Lake Champlain.) During this time, a towpath for hauling barges was built up on the bank of the creek. Only two or three feet above low water level, it provided a path for horses and oxen to use.

When Orville bought the 100 acres to add to his marshland, he gained control of the narrow outlet which connected the marsh to Otter Creek through the towpath on the bank. Then he called on his soil conservation district for help in solving his problem.

Soil conservationists from the Middlebury work unit of the Soil Conservation Service made a survey of the area. They designed a small earth-fill dam for the outlet of the marsh and a low concrete-and-pipe structure to control the water level and provide for draining when necessary. The dam and control structure were built late in 1958, at a cost of about $250. The level of water stored over the 250-acre marsh was raised by nearly two feet.

Ducks and muskrats looked the place over, visited it, and decided it was good. They moved in and started to raise families.

In 1960, as more open water showed in the cattails and buttonbush and word of the new housing development spread among the wood and Black ducks, gallinules, rails, and muskrats, populations increased. Orville and his sons did some muskrat trapping in the spring, harvesting about 300 pelts.

Following nesting season, hundreds of ducks could be seen using the marsh. Many more visited it on their annual migration south. Using native materials and the boats built for trapping operations, the Danyows constructed several duck blinds and prepared for some real sport.

Their comment at the end of the hunting season, with typical Yankee reserve and gift for understatement was, "Well, it was pretty good, for a dollar-an-acre investment on land not worth the taxes."

Strip Mine Becomes Wildlife Haven

By Ernest Dierks

TWELVE years ago the Garrison Sportsmen Club set out to see whether trees would change the rough, unsightly spoil banks of a North Dakota strip mine into a place of beauty and a haven for wild creatures.

It is evident that their efforts have been well repaid. The trees—most of them—are thriving. Pheasant, partridge, and sharp-tailed grouse are making the area their home. Occasionally you can spot a whitetail deer there, too.

The mine is the still-active Custer Strip Mine, a source of lignite, near Garrison in the West McLean County Soil Conservation District.

In carrying out their program, the sportsmen's group had the help of the soil conservation district, the North Dakota Game and Fish Department, the Soil Conservation Service, and—perhaps more important—a group of boys from the community.

Some of the trees were planted in 1949. The soil conservation district supplied this stock, most of it left-over seedlings from the district's regular tree planting program.

The Game and Fish Department

Note:—The author is work unit conservationist, Soil Conservation Service, Washburn, N. Dak.

Trees and shrubs in the Custer Strip Mine area that were planted by the Garrison Sportsmen Club.

Pond in the Custer Strip Mine area with willow plantings around the edges.

then began furnishing seedlings also.

The men of the Soil Conservation Service helped with their tree planting know-how.

A spoil bank is no place for tree-planting machinery such as is used to plant windbreaks on North Dakota farms and ranches. The job had to be done entirely by hand.

A man and a boy made a tree-planting team. The man opened the hole, the boy placed the seedling and tamped the soil around it.

The teams planted thousands of trees each year through 1959.

Several of the first plantings have made splendid progress. Chinese elm in some areas are over 20 feet high. Willow cuttings, put on the edges of some of the permanent water holes, have made good growth. Russian olive are doing well.

Ponderosa pine and cedar are making progress, too. However, survival of these species, as might be expected, has been less and growth is naturally slower.

No cultivation is possible on spoil banks. The trees have to make it on their own. Of course, there is little competition from grass and weeds on the spoil banks, which helps. And the spoil area is protected from grazing.

Some of the sharp ridges of the banks were leveled with bulldozers and basins shaped on top to catch rain and snow. Trees were placed around the edges of these depressions to get the benefit of the additional moisture.

In undisturbed areas adjacent to the spoil banks, the Game and Fish Department planted trees with regular tree-planting equipment. These trees have been cultivated regularly.

The Garrison Sportsmen Club takes great pride in the results of its effort.

"We think we have proved something that can be useful over the rest of the lignite mining area in the State," said Walter Link, club president. "There are hundreds of acres of these spoil banks in North Dakota. We got pleasure in carrying out the project. It gave us a chance to do a worthwhile job with our youngsters, all of whom got a lot of benefit—conservationwise—out of it, too."

Stubble Mulch Farming

Stubble mulch farming is an effective practice in controlling wind erosion. It also is effective in controlling water erosion by reducing runoff and increasing the storage of moisture in the soil during intense rainstorms. But stubble mulching is not a substitute for other good conservation practices. Contour farming and terracing improve the effectiveness of this practice on hardlands by increasing the storage of water in the soil.

Stubble mulch farming is not only a method of tillage but also a planned system of farming. The mulch provides protection against wind erosion on sandy land, second only to grass or growing crops. It also is effective on hardlands that are subject to wind erosion.

Stubble mulch operations should start at harvest time. A good straw spreader is needed to insure an even distribution of straw so that piles or windrows of straw are avoided. The height of the cutter-bar should be regulated to provide maximum height of stubble without hampering harvesting of the crop.

Tillage operations should be timely and should maintain an adequate amount of mulch on the surface throughout the season, control weeds, provide a cloddy field surface for erosion control and water conservation, and provide a moist, firm seedbed at seeding time.

Seeding operations should be done efficiently to provide a good crop yield and an adequate amount of residue for the next season, and at the same time maintain enough residue on the surface to protect the field surface and the young plants from wind erosion.

WALTER E. SELBY
Agricultural Engineer
Kansas State Extension Service

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In each 5-year period since 1935 the average farm size has increased by 10 to 13 percent.

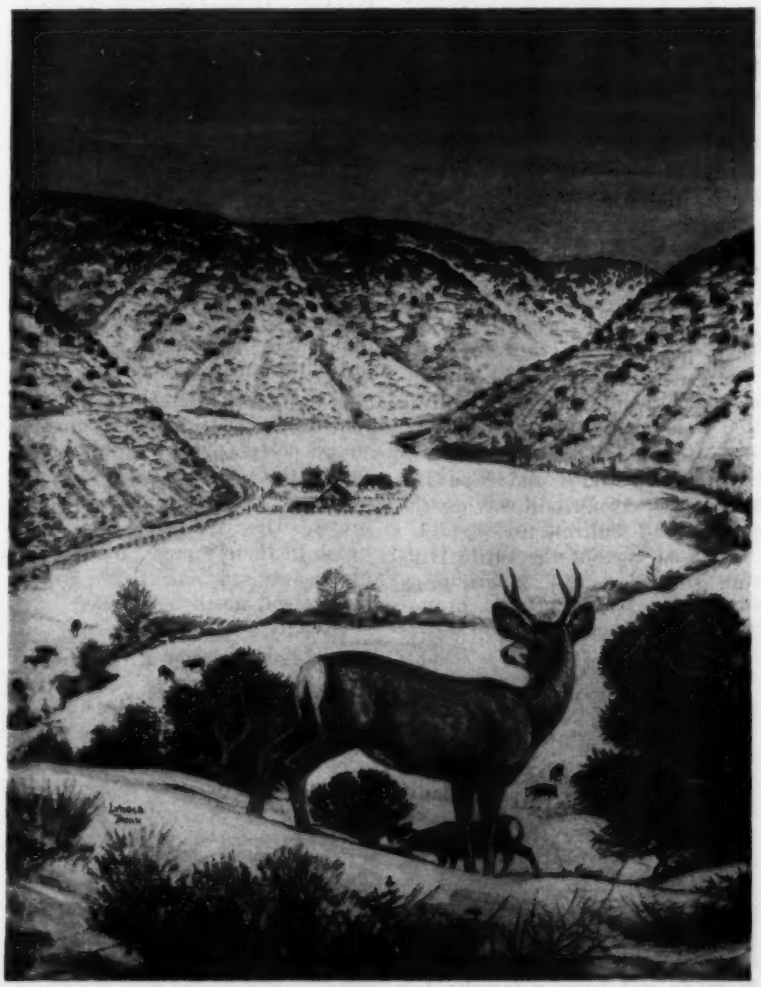
A CONSERVATION PLAN FOR 1,500 Cattle and 100,000 Deer

By Ellis F. Sedgley and Harold M. Boeker

TECHNICIANS of the Colorado Game and Fish Department, the Soil Conservation Service, and the Bureau of Land Management are presently working out a unique conservation plan. When completed, the plan will include management policies and land improvements for a 218,000-acre ranch owned and operated by the Colorado Game and Fish Department. The ranch presently supports, under lease agreements, approximately 1,500 Hereford cattle and, with adjacent areas, the largest migratory deer herd in the United States—estimated at 75,000 to 100,000 animals.

The White River Plateau was the historical game range of the Ute Indians. Following the famous Meeker massacre in 1879 and the expulsion of the Utes to Utah reservations, cattlemen moved into the lush Indian lands with thousands of cattle. From 1880 to 1920 the country experienced great vegetative and biological changes. The pressure imposed on grass cover by cattle caused a shift from grass to browse-type vegetation. The increase in browse favored the deer, and there was an explosion in deer population. By 1920 the range was no longer suited for cattle. From 1920 to 1940 sheep interests joined the cattle and deer in competing for what was left. As the total vegetation decreased, soil stability was lost and erosion threatened to destroy the once-productive land. Livestock operators were forced to cut their herds drastically. Starvation cut back the deer herd.

Realizing the importance of maintaining the White River deer herd, the Colorado Game and Fish Department in 1946 acquired a large block of land in the heart of the White River deer herd's winter range and established the Little



Artist's conception of Little Hills ranch on the White River Plateau of Colorado.

—Artwork by Lyndle Dunn, Colorado Game and Fish Department

Note:—The authors are, respectively, work unit conservationist, Soil Conservation Service, Meeker, Colo., and regional land manager, Colorado Game and Fish Department, Rio Blanco County, Colo.

Hills Experiment Station. Studies were begun at Little Hills to determine the interrelationships between range conditions and various degrees of use by livestock and deer.

The Little Hills studies showed a marked difference in forage preferences by cattle, sheep, and deer. Cattle preferred grass, sheep preferred forbs, and deer were heavy users of browse plants. Only when one type of animal was out of balance was there serious damage to the range.

In 1956 the Colorado Game and Fish Department acquired two additional ranches adjacent to the Little Hills unit. The new acquisitions, with their public domain grazing permits, gave the department control over a major portion of the White River deer herd's spring and winter range.

Cattle numbers were reduced from 3,200 to 1,500. Liberal hunting seasons were used to reduce deer numbers—in 1957, hunters took 25,000 deer from the White River herd.

The department became a cooperator with the Lower White River Soil Conservation District in 1957. Soil Conservation Service technicians joined Game and Fish Department personnel in solving the problems of multiple use.

SCS surveys of the Little Hills unit showed an unbalanced grazing pattern by livestock. With the cooperation of the Bureau of Land Management, new water developments were constructed to improve cattle distribution. The lessee, an officer of the Lower White River SCD's board of supervisors, agreed to improve and develop spring pastures on his patented land. Today, with less grazing pressure and better distribution, the ranges are improving.

Mountain mahogany, a favorite deer food plant, and other browse plants on Little Hills ranch.

Harold Boeker and Ross Campbell tagging a trapped deer on the Little Hills ranch.

Tentative plans include the control of big sagebrush on summer ranges. Here range productivity for cattle can be increased without greatly reducing palatable deer browse. Deer use very little sagebrush in their summer diet. Sagebrush on critical deer winter ranges will not be controlled.

Large acreages of fertile bottomlands were overrun with unpalatable plants such as rabbitbrush and greasewood. These areas will be converted through brush control and reseeding to wheatgrass pastures. During early spring, deer feed heavily on new green grass, and the wheatgrass will provide spring grazing and alleviate deer pressures on other areas. The wheatgrass bottomlands may also serve as cattle pastures in the multiple-use pattern.

Stock ponds and drift fences will be constructed to improve livestock distribution. A system of deferred grazing will be initiated to give large range areas periodic rests. Meadow improvement practices will be established to increase hay and pasture production on irrigated lands. All of these practices will be aimed at balancing range use by cattle in a manner that will improve range condition.

At the same time a parallel management program will be followed to maintain the deer herd in balance with feed conditions. Trend counts and hunters' kill reports will be used to indicate the trend in deer numbers. Hunting seasons and bag limits will be closely regulated to keep the deer herd in balance with the food available.

Through a sound multiple-use plan of conservation management, the range should return to a stable, productive condition. The great migratory deer herd of the White River will be assured for future generations of sportsmen, and once again there will be lush grass for White River cattle.

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A total of 14,634 SCS employees were registered in the Government-wide health benefits program in 1960. Of these, 49 percent registered in the service benefit plan, 42 percent registered in the indemnity benefit plan, and 2 percent registered in one of 16 other available plans. About 7 percent expressed their desire not to participate in any of the available plans.

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Trout Pond in Virginia

By Wayne M. Hypes

RAISING rainbow trout in Virginia farm ponds is a difficult undertaking. Biologists tell you that even when certain conditions are met, success is not certain. The conditions include maintaining a water temperature below 70 degrees F. and a rapid change of water in the pond.

C. R. Osborn, owner of the Mill Run Farm in Bath County, wanted a trout pond. He requested SCS technicians assisting the Mountain SCD to lay out and supervise the construction of a pond for trout. Search for a site revealed about 4 acres of idle wetland which it was not practicable to drain. The spot was an eyesore that did not fit into the landscape of the farm.

This proposed pond site had a 640-acre watershed. The large size of the watershed caused some problems in the discharge of floodwaters safely and keeping silt and trash out of the pond. One encouraging factor, however, was a cold spring in the watershed with some native trout in the spring branch. A later survey showed that the spring had a low flow of 2,000 gallons per minute with a temperature of 58 degrees.

The design agreed on called for a concrete spillway above the pond to control floodwater. The spillway created a catch basin to keep silt and trash out of the pond. A 24-inch pipe, with gate valve, carries water from the catch basin into the pond. Another 24-inch pipe through the pond dam serves as an overflow pipe.

In 1955 the four-acre pond was completed. Osborn stocked it with 1,000 rainbow trout fingerlings furnished by the U.S. Fish Hatchery through the Mountain Soil Conservation District. He purchased an additional 1,000 mature rainbow trout in 1956.

Note:—The author is soil conservationist, Soil Conservation Service, Staunton, Va.

Concrete-lined spillway and catch basin above the Osborn trout pond with gate valve to regulate water flow into the pond.

Cy Osborn casting for a rainbow trout near the intake to the trout pond on Mill Run Farm.

Ever since, fishing has been excellent and the rate of growth good. The highest temperature recorded has been 68° F. in top water and 64° in deep water. Water depth ranges from 3 feet to 12 feet.

An interesting feature of this pond is that the trout go upstream to spawn. During spawning season large trout can be seen going through the 24-inch intake pipe and up the stream. There is about a 1,000-foot stretch of stream between the pond and the spring. Red trout eggs can be seen all along the gravel beds in the stream. The presence of fingerlings proves that the trout do spawn sucessfully. Small as well as large trout have been caught in the pond—further proof of spawning. All indications are that satisfactory fishing can be maintained without further stocking.

Fishing in this pond is not like fishing in a barrel as a lot of people think. The fish have become acclimated to the water, and you have to be an experienced fly fisherman with a reasonable

amount of luck to land a nice creel. When you do, you may have a trout that is 18-20 inches long. Fishing is permitted by invitation only.

It is apparent from Osborn's experience that in the higher elevations of Virginia, and where there is a good supply of cold water, trout can be produced successfully in properly designed farm ponds.

Before building the pond, Osborn and his farm manager, Wayne B. Schooler, had been applying a coordinated soil and water conservation plan with technical aid from SCS technicians. They had successfully installed 7,000 feet of tile drainage and 4,000 feet of open ditches. They had seeded several acres of pasture, improved all the other pasture, and established 10 acres of alfalfa and orchardgrass. With the assistance of the Virginia Division of Forestry, all woodland management and conservation measures were in effect. In general, Osborn and Schooler were practicing good conservation on all their land.

Pier constructed over the overflow pipe and gate valve on drain pipe of the trout pond, with the Osborn farmstead in the background.

'Way Down East—

Fish Are Soil Survey "Customers"

By Bernhard A. Roth

THE soil needs of Mama Salmon and Mama Clam may seem of trifling concern—and for eccentrics only—when viewed in the shadow of vaster sciences of the earth. But not in Washington County, Maine! For the citizens of "U.S.A.'s sunrise county" reckon that these two species of waterlife are among the most important assets of the county.

So, when SCS soil scientists started to survey and map the soils of Washington County, State fish and game officials soon asked for help on some of their problems. "Like it or not," observed Keith A. Havey of the State Department of Inland Fish and Game, "salmon are customers for your soils information. We find there's a marked relationship between type of streambottom and location of spawning and nursery areas."

SCS soil surveyor Kenneth J. LaFlamme agreed that fish, along with all other local natural resources, seemed legitimate beneficiaries of their services. From Havey, LaFlamme learned that the propagation of salmon rests vitally on a key number of streams featuring cobbly-bottomed riffles. Here, the female salmon "digs" egg pits known as redds and the male fertilizes them in the fall, for

Keith A. Havey (left) and Kenneth LaFlamme studying a cobbly bottom on Barrows Stream.

Note:—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.

hatching in the spring.

Salmon specialists, according to Havey, can accurately predict the rate of reproduction—and thus stream population trends—only when they know the precise acreage and location of suitable bottoms. Stability and control for a soils study were reasonably assured in that salmon are "homers" with a powerful instinct to use the same grounds year after year.

LaFlamme saw no reason why strips of streambottom—often no more than 20 feet wide—could not be comfortably added to his routine investigations in the back country. As a trial, he and Havey have been type-mapping a half-mile of Barrows Stream on the upper reaches of the East Machias River. The stream is an inlet to Love Lake, topnotch landlocked salmon center in the East Machias watershed. Landlocks use the stream for spawning each year.

Salmon soil-mapping currently includes delineating bottoms directly related to the fish—sand, gravel, and cobbles at the head or tail of rapids. For his own efficiency in a mission foreign to most SCS soil scientists, LaFlamme is developing new techniques in scanning streambottoms largely by studying related soils at the bankside. It saves considerable wading and frequent dousing in waters seldom far from freezing, even in summer.

The soil scientists got into the clam industry in similar fashion. Malcolm E. Richards of the State's Department of Sea and Shore Fisheries reported that local clammers were suffering from shrinking production on nearby flats. Seriousness of the situation stimulated his interest in leaving no stone unturned to improve matters. He knew there were many things yet to be learned about the relationships of soft-shell clams, other marine organisms, and marine sediments. He figured that a proper interpretation of soil survey information should help solve some of the problems.

SCS soil scientists gathered some surprising facts from Richards. Contrary to popular belief, clams do do not simply stick in the mud. As young juveniles, they select a variety of sediment in which to wrap their byssus threads and develop. They are believed to move around a great deal to find suitable conditions. Reasons behind their affinity for certain sediments are a mystery.

Since tidal areas are available to them even in the depths of Washington County's most severe winters, SCS men have welcomed the chance to be helpful to the local marine fishing enterprise, worth close to $3 million yearly. Sediment investigations are now underway on Passamaquoddy Channel Flats below Lubec, prime clamming grounds since prehistoric times.

Classification of soils and sediment for the advantage of fish and wildlife biologists is not new. But it is big news in the U.S.A.'s easternmost county where the protection and management of nature's wealth clearly affects the fortunes of everyone. Happier clams and more satisfied salmon will continue to be worthy of soil surveyors' efforts in Washington County folks' scheme of things.

Malcolm E. Richards (left) and Kenneth LaFlamme investigating sediment types on Passamaquoddy Channel Flats.

SCS soil scientist and Maine fish and game biologist making a seine-count of the salmon hatch on Barrows Stream.

Beaver Pond Grows Duck Food

By Luther E. Gowder

GRAYFIELD Hamilton, a Greene County, Ala., farmer, leased the duck hunting rights over a large beaver pond area to sportsmen last fall. The lease is for a period of 12 years and brings Hamilton a substantial income from an area that previously was producing nothing of value.

In the spring of 1959, Mr. Hamilton was disturbed by the damage beavers were causing to his land and timber by impounding water. One large 85-acre beaver pond was killing fine young hardwood timber, and making the whole area worthless for any other profitable use.

Mr. Hamilton, a cooperator with the Black Belt Soil Conservation District, appealed to his local soil conservationist for help. A Soil Conservation Service biologist, Dale H. Arner, was called in to help with the problem.

Arner proposed that they break the beaver dam in June 1960, and lay a 3-log drain in the break so the water would continue to drain if the beavers repaired the dam. This drain was installed under the supervision of J. P. Tidmore, SCS soil conservation aid. The beavers attempted to repair the dam but could not stop the water from flowing between the three logs that were tied together with wire.

After the water left the area by way of the 3-log drain, Hamilton cleared 25 acres and planted it to Japanese millet. The rest of the 85 acres, which had a scattered stand of young timber on it, produced a volunteer crop of smartweed. Both areas produced excellent seed crops, which are choice duck foods.

In October Hamilton pulled the 3-log drain out of the gap in the dam. A few days later the beavers had repaired the dam. As fall rains came, the water from springs and the small creek began to cover the millet and the smartweed plants.

Then with colder weather came the ducks. Duck shooting was very good in this area by late November. The hunters are pleased with their lease and their hunting rights. Hamilton is happy to find a profitable and pleasurable use for the 85 acres of swampland that had previously appeared useless.

The techniques for developing duck ponds from beaver ponds are simple and inexpensive. The ponded water is lowered in June or July by breaking the beaver dam. The 3-log drain is placed in the break to allow continuous drainage should the beavers repair the dam. For some unknown reason, in the past the beavers have not rebuilt the dams during the summer season.

The wetter areas should be planted to Japanese millet by broadcasting the seed over the wet, freshly drained land. The drier areas should be seeded to browntop-millet after good seedbed preparation. All seeded areas should be

Note:—The author is work unit conservationist, Soil Conservation Service, Eutaw, Ala.

Breaking a beaver dam to drain the 85-acre pond on the Grayfield Hamilton farm.

Japanese millet growing in the drained area above beaver pond on the Hamilton farm.

fertilized. A natural stand of smartweed usually comes into these areas. The degree of wetness that remains on various sites should determine whether Japanese millet or browntopmillet be planted. The seed of all these plants usually matures during October in this climate. At that time the drain logs should be removed. The beavers usually will rebuild the dam within a few days.

Beavers have flooded many bottomland areas in Alabama, usually in flat, wet, woodland sites, and beavers are increasing rapidly.

Volunteer stand of smartweed in drained area above beaver pond on the Hamilton farm.

The water impounded kills extensive stands of hardwoods and floods small bottomland fields and pastures. The beaver's fur has some value, but its value does not equal the damage inflicted on Alabama farmlands.

The system that SCS biologist Arner has developed now enables soil conservationists to help landowners plan, establish, and maintain profitable land use on areas the beavers have taken over. By developing the ponds for shooting areas, a farmer can utilize this wildlife species, once considered a pest, as a partner in his conservation operations.

No doubt the development and management of beaver ponds will be improved as additional experience is gained.

Hunting on the Contour

By John Nehoda

THE old saying, "good news travels fast," was not coined by a hunter; but they sure make use of it when it comes to locating good hunting areas. That's the way Eddie Phillips put it as he counted the cars parked around his farm buildings on opening day of hunting season.

The first week more than 60 hunters from the greater Pittsburg area spent at least four hours apiece on Eddie's 138 acres near Greensburg. "The older fellows," Eddie remarked, "stayed all day. The hunting was good; rabbits, squirrels, and pheasants were plentiful."

Five years ago things were different, Eddie recalls. Hunters made no special effort to hunt his place. In fact, Eddie himself did very little hunting on his newly purchased farm. Today, long before the gunning starts, hunters drive out to see Eddie about getting permission to hunt. What made the difference?

Shortly after Eddie bought his rolling hill farm, he became a cooperator of the Westmoreland County Soil Conservation District. With the help of SCS technicians, he developed a conservation plan for managing his land. His aim was to use the land to support his growing dairy herd and he wanted to hold the soil and water on the farm.

Three and a half years have gone by since Eddie set out to reach his objectives. This year he placed first in the Baltimore and Ohio Conservation Contest for his outstanding work in managing the soil, water, woodland, and wildlife on his farm. And he's producing just about all of the feed needed by his 68-cow dairy herd.

Farming is a little different now, Eddie tells you. "We are holding most of the rain that falls on our land by using contour stripcropping. Each row acts as a dam, reducing the loss of soil and water

Eddie Phillips hunts small game in a border strip on his farm.

Note:—The author is work unit conservationist, Soil Conservation Service, Greensburg, Pa.

from the farm. I've also noticed how yields have picked up since we started striperopping.

"There's been another change, too, since I started striperopping, and that's the increased number of pheasants that hang around all year. Wildlife specialists tell me that ideal wildlife areas are created where different strips or edges of crops meet, such as corn and grass or small grain and grass. The edges make good nesting places for quail and pheasants. This idea of edges is new to me but I know that since I started striperopping I have seen a lot more small game on my place.

"Last spring the Pennsylvania Game Commission helped me establish the wildlife border outlined in my farm conservation plan. We cut down a strip of woods 30 feet wide and 2,000 feet long next to the crop fields. Long whips of native shrubs and other vegetation moved in and so did the hunters. The area was a beehive of activity all during the gunning season. Men and dogs worked it hard with a lot of satisfaction."

Jack Nehoda, SCS technician, (left) and Eddie Phillips check a recently constructed terrace on the Phillips farm.

An area 30 by 2,000 feet sounds like a lot of land to devote wholly to wildlife, but Eddie doesn't look at it that way. Eddie recalls how the crops next to the woods always looked poorer than the rest of the field. Shading and competition for moisture by the trees made the difference. Then there was always the problem of low-hanging limbs interfering with field work. Eddie also is aware of the value that wildlife border will have in increasing the number of insect-eating birds on his place.

Ending in the wildlife border are grassed terraces which circle the entire farm—protecting the land from erosion by leading off the surplus water. These terraces are good travel lanes for reaching new areas of food supply. Ground-nesting birds find the terraces ideal, for they provide ready access to food, water, and shelter. To Eddie Phillips, these terraces provide protection for his chief resource—his soil.

Farm game has been on the increase on Eddie Phillips' farm in the past few years even with a healthy gain in the number of hunters. In reaching his goal of better land use, wildlife also benefit.

Range and Wildlife Management

On a South Dakota Ranch

By Robert O. Koerner

THE 7,000-acre ranch of Glen E. Garrett in western Sully County, S. Dak., is a fine example of how a ranch can be developed and managed to produce record crops of beef and wildlife.

Garrett credits his thriving wildlife populations to three essentials —cover, food, and water. These are provided in varied ways on the ranch as Garrett carries out a complete Great Plains Conservation Program plan. He was the first in the Sully County Soil Conservation District to enter the program and lost no time putting his plan into operation.

Note:—The author is work unit conservationist, Soil Conservation Service, Onida, S. Dak.

Proper range use—beneficial to wildlife as well as to domestic animals—has always been a rule on the Garrett ranch. The heavy grass and mulch slow down runoff. As a result, his stockwater ponds haven't been filling even in years of above-normal rain. That has meant fine cover but sometimes not enough water.

Water was always a worry on this ranch. Glen's father, Geoff, recalls, "We never knew whether we would have enough to carry the stock through the summer. If we didn't get enough runoff in the spring to fill the ponds, they would be nearly dry by fall."

The Garretts put in many stock ponds over the years; but with the meager runoff, water was not dependable enough to permit the right kind of rotation grazing system.

"The better we managed our range the less runoff we would get," Garrett stated. "This complicated things still more. The Great Plains Conservation Program seems to be the answer to this problem. We have been needing help like this for 25 years."

The Great Plains Conservation Program helped the Garretts put down two artesian wells. Now, water from these wells flows to 14

stockwater ponds through 26,000 feet of underground plastic pipe.

The Garretts say this water is as useful to wildlife as it is to livestock. Last year in Sully County most pheasants and other birds suffered from lack of water. Yet on the Garrett ranch, pheasants and grouse could be seen at almost any time coming from the surrounding trees and fields to water.

The deeper ponds are stocked with bass and bluegills. One pond is stocked with rainbow trout. That means food and fun for the family and the neighbors. Garrett manages his ponds to maintain a productive balance in numbers and kinds of fish.

Thousands of ducks and sometimes a few Canadian geese rest on these ponds during migration season. An abundance of feed in the surrounding cornfields also attracts these birds.

Garrett carefully protects the wildlife on his farm but he does not prohibit hunting if people "ask before they enter." He explains that he has a big investment in his livestock and cannot afford to have gates left open.

In the past 10 years, Garrett has planted 32 acres to trees. Ten of these acres were planted strictly for wildlife. About 500 sharptail grouse and prairie chicken, along with many pheasants, have been wintering in the trees. In the warmer months, deer from the Missouri River breaks use these wooded areas. In the spring of 1960, Garrett planted 22 acres more to trees and shrubs under his Great Plains Conservation Program plan with accent on kinds beneficial to wildlife.

Part of the Garrett range in the foreground where controlled grazing has resulted in good grass growth for livestock and wildlife.

A 65-acre wildlife area behind Garrett's largest pond is fenced to keep out livestock. A pipe through the dam with a tank and float below supplies water for livestock. This protected area is in top condition. It has an abundance of taller growing grasses such as big and little bluestem, sideoats grama, needle and thread, green needle, and western wheatgrass. Western snowberry, buffaloberry, wild plums, and other wildlife cover plants grow in the side draws.

Food for wildlife is provided by grass seed and the fruit and berries from the tree and shrub plantings. Garrett plants corn on some of his cropland and leaves it in the field until he turns hogs into it in the fall. The corn left by the hogs makes fine feed for migrating ducks and geese as well as for pheasants, deer, and grouse.

South Dakota wildlife has never had truer friends than the Garretts. Since 1883, three generations of Garretts have maintained and improved wildlife habitat on this ranch. Through proper land use aided by a complete conservation plan, they have increased the production of wildlife in the same manner in which they have increased livestock production. Although their range and wildlife habitat are in excellent condition, they are continually striving to improve them.

Part of the 65-acre wildlife area on the Garrett ranch that has been fenced to exclude livestock. The pond is stocked with fish.

New Home for Ducks

By Wayne A. Ruona

WILDLIFE is getting a new lease on life in the Becker County Soil Conservation District of northwestern Minnesota. A 140-acre wildlife development has been constructed which will give a boost to useful forms of wildlife, make the hunting better for miles around, and help in flood control.

It all began when a group of sportsmen from St. Paul and Minneapolis set out to find a good hunting and duck-breeding site.

"We'd like to buy an isolated piece of ground that we can fix up to suit ourselves," a spokesman for the group told Soil Conservation Service technicians at Detroit Lakes. "It would have to include some low ground and have possibilities for hunting and duck breeding."

It so happened that the SCS people knew of a swampy pasture area, site of a former lake, which had been drained by a legal drainage district about 40 years ago. It seemed to meet all the requirements.

The Twin City sportsmen organized themselves into the Hamden Gun Club. Then they bought the land around the old lake and got easements on some additional acreage to make a compact unit.

As landowners, they were eligible to enroll as cooperators with the Becker County Soil Conservation District and make an official request for the biology and engineering help they needed.

Plans, as later completed by the Hamden Club and SCS technicians, called for development of two pools—the upper one to be a water reservoir and duck breeding area with a maximum water depth of five feet; the lower to be used for growing duck foods during most of the year and then flooded in the fall.

When full, the upper lake provides 70 acres of water surface. About 75 acres in the lower pool is flooded to a depth of 1½ feet in the hunting season. The earth dam for the upper pool, 500 feet in length and 24 feet wide on top, is used as a farm road. The lower dam is 700 feet long with an 8-foot top width. Both dams have built-in water control structures.

To make the place more inviting

Wetland area developed for wildlife by the Hamden Gun Club: (above) The area before development. (below) A part of the 70-acre upper pool after the earthen dam was constructed.

Note:—The author is work unit conservationist, Soil Conservation Service, Detroit Lakes, Minn.

to ducks, 13 mounds of earth were pushed up with a bulldozer on the floor of the upper pond. The resulting islands provide additional nesting and loafing space to supplement the shorelines.

In the spring and summer of 1959 over 200 young ducklings were seen on the upper pool. In addition, ring-necked pheasants were present on the adjacent land.

The owners had little difficulty in getting their limits during the following hunting season.

In March 1960, 63 muskrat houses were counted and mink sign was abundant, clearly indicating that this area has benefited furbearers as well.

On May 6, 1960, over 1,000 waterfowl were counted on the upper pool. Canvasbacks, redheads, blue-winged teal, mallards, lesser scaup, and pintails were some of the duck species identified.

If managed properly, good duck foods like browntopmillet, barley, buckwheat, and smartweed can be seeded in the early spring after draining the lower pool.

If everything goes as planned, there should be a continuously rich reward in ducks, fur-bearing animals, songbirds, and other wildlife. There also will be more water storage and less flooding of farmland from heavy summer storms.

◆

Sustained Superior Performance awards amounting to $85,447.71 were made to 518 employees by the Soil Conservation Service during fiscal year 1960. The Service also awarded $4,080 to employees for 61 special acts or services.

◆

The automotive fleet of the Soil Conservation Service, consisting of 841 passenger vehicles, 10,349 light trucks, and a few miscellaneous vehicles, traveled 99,305,940 miles during the fiscal year 1960. The average cost per mile was 5.67¢.

Pheasants— By the Hundreds

By Howard V. Cheney

HUNDREDS of pheasants—any time you care to look for them! This is a hope that a Kansas rancher, Judson Barclay, Jr., has brought close to reality on his 1,030-acre place near Grinnell through a well-planned program of soil and water conservation with an outdoorsman's special interest in wildlife.

Barclay is not yet through with his effort as a conservation rancher and wildlife enthusiast. His latest step has been to develop a complete soil and water conservation plan under the Great Plains Conservation Program.

This plan, which he has worked out with the help of the Soil Conservation Service men assigned to the Gove County Soil Conservation District, is not substantially different from the conservation plan he developed in cooperation with the district a few years ago. But it has the advantage of a thorough schedule for carrying out the work, plus cost-sharing help for major practices to speed up the job.

Barclay, who serves as chairman of his soil conservation district board, began his wildlife improvement work years ago. For part of it, he made use of cost-sharing help from the Agricultural Conservation Program with technical assistance from the Soil Conservation Service.

Then when the Soil Bank program began, Barclay made use of the opportunity to include the wildlife practices offered in the Conservation Reserve part of the program. He planted part of his better cropland to native grasses. To get good distribution of food and grassy cover, he planted 1-rod-wide strips of sorghums every 100 yards in this 400-acre field. Between the food strips he put a

Note:—The author is work unit conservationist, Soil Conservation Service, Gove, Kans.

A section of the 2,000-foot-long windbreak planting on the Barclay farm, with wildlife food planting of sorghums on the left.

native grass mixture of bluestems, western wheatgrass, and sideoats and blue grama.

For winter cover Barclay added a five-row tree and shrub windbreak 2,000 feet long below a terrace. The two north and west rows are North Platte wildling redcedar, the center row is half mulberry and half Russian olive, and the two south and east rows are made up of 10 kinds of shrubs. The foodpatch plantings are near the windbreak.

Early in 1960 Barclay set out to complete his work under the Great Plains Conservation Program. He will practice proper use of his range resources and the conservation use of his crop residues. Both of these practices are important in conservation ranching, but neither draws cost-sharing help for the rancher. Cost-shared practices include the completion of terracing, building needed dams, and planting hedgerows and odd corners to cedar.

Barclay has gone far enough with his program to feel sure he is on the right track. Pheasants have been showing a marked increase. His place soon should have few equals as a home for wildlife—especially pheasants— in this part of Kansas.

More Quail and Deer

On a Texas Ranch

By Joe Coughran

HARRY Zavisch is about half through with the brush control and range reseeding job on his southern Texas ranch. And he says: "I have more quail than ever, and just as many or more deer."

Zavisch has more than the ordinary interest of a rancher in wildlife. For one thing, he and others in his family like to hunt. And, hunting leases are a source of income for Zavisch. A group of sportsmen leases the ranch for hunting privileges each year.

Zavisch started with 220 acres southeast of Tilden, Tex., in 1932. He added to the place over the years. The ranch now covers 2,291 acres.

Note:—The author is work unit conservationist, Soil Conservation Service, Tilden, Tex.

Quail moving to shrub cover after feeding in field of blue panicum on the Harry Zavisch ranch.

The range had good grass until 1947. Then a three-year stretch of declining rainfall began, followed by five years of severe drought. This left the range practically bare except for the dense brush.

At the start of the drought, Zavisch noted the rapid decline in his range grasses. There was a drop, too, in income. In January 1951, Zavisch got help from the Soil Conservation Service men assigned to the Dos Rios Soil Conservation district. With their help, he worked out a conservation plan. In this plan he gave plenty of thought to the needs of wildlife.

"I had been trying to protect my range," Zavisch said. "But the drought was always a long jump ahead of me. I was overstocked. In fact, at times a single cow would have overstocked my ranch."

While he was serving as a supervisor of his soil conservation district, Zavisch had a chance to see the effect of the first root-plowing and reseeding done in the area. He became convinced that these practices, in combination with the other soil and water conservation work

he was doing, would mean much to his ranching enterprise.

In May 1955, Zavisch root-plowed and seeded 160 acres of the land most heavily infested with brush. A 2-inch rain brought the blue panicum up to a fair stand.

He kept stock off this area to give the stand a better chance. In September another good rain helped the grass to mature and seed.

During these months the areas still infested by brush stayed grass-poor.

This experience was convincing. Zavisch continued to root-plow and seed at the rate of about 200 acres a year. Over 1,100 acres now have had the benefit of the practices. They show it.

Zavisch cross-fenced the improved areas into 160-acre tracts. This makes it possible for him to defer grazing on each pasture. He periodically moves the cattle from one pasture to another.

In carrying out this part of his conservation plan, Zavisch was always careful to leave brushy cover for wild animals and birds. Along each of the small draws he made sure strips of brush were left. These strips, with the fine grass handy, created an environment that deer and quail like.

One quail-hunting enthusiast declared: "Never saw so many quail in any one place, and I've hunted quail all my life."

"Deer hunting is good on this place, too," another hunter said. "I have plenty of chances to get a deer. I always wait for a big one. I know he'll be along."

Zavisch insists that soil conservation, with its accent on good range management, is the way to successful ranching in his part of Texas.

"I am careful now to keep good grass cover on my land," he says. "The grass checks water loss and controls washing. This means a lot, not only to my livestock operations, but to the wildlife as well on my place."

Catfish Farming

By Brice M. Latham

TWO farmers in Abbeville County, S. C., can furnish firsthand information about catfish farming. They are W. M. Agnew, of Donalds, and C. W. McIlwain, of Abbeville, who tried this new type of farming operation for the first time this year. Both men had stockwater ponds on their farms but had never thought of "farming the water" until the suggestion was made by W. W. Neely, SCS biologist, and W. A. McPhail, SCS technician at Abbeville.

The ponds were stocked on March 17, at a rate of 1,500 speckled bullhead catfish fingerlings (weighing about 50 to the pound) per acre. After stocking, the ponds were fertilized with 40 pounds of 20-20-5 fertilizer. Feeding was begun April 18, at the rate of 2½ pounds of 36-percent protein hog supplement in pellet form. Food was put in every two to three days thereafter.

In October, the ponds were drained and the fish harvested with a 1½-inch mesh seine. When the net was pulled through the Agnew pond for the first time, about 250 pounds of splashing catfish were pulled out.

Agnew harvested 450 pounds of fish from his ½-acre pond and the 0.8-acre McIlwain pond yielded 485 pounds. The largest fish weighed in at 1 pound and 1 ounce;

Note:—The author is area conservationist, Soil Conservation Service, Anderson, S. C.

Catfish taken from the McIlwain pond. Buddy McIlwain in the background.

the average weight was approximately 10 ounces. Most of the fish were sold to neighbors at 35¢ per pound "on the fin" or 55¢ per pound dressed. The flavor was excellent.

In addition to the edible fish harvested, the ponds were alive with fingerling catfish. Many of these were sold to neighbors who wanted to stock their ponds and begin "farming their waters." Agnew and McIlwain restocked their ponds and plan to harvest the next crop of fish in June.

Since this was the first time catfish had been grown on hog feed in this section, complete records were kept of all expenses. For the Agnew pond, the cash return for the pond and labor was $90; McIlwain netted $143 from his pond.

McIlwain had this to say: "I already knew the importance of proper land use; now I am going to have to start thinking about proper water use, too. I have restocked my pond and am looking forward to another harvest next June. There are still some 'bugs' to be worked out in management; but I can see the potential of two catfish crops per year."

Agnew and McIlwain are cooperators in the Abbeville Soil Conservation District—Agnew was a member of the board of supervisors for a number of years. McIlwain, in addition to operating a farm, is employed by the Soil Conservation Service as a conservation aid.

Cottontails and Bobwhites—

On a Cattle Farm

By Dalton Rushing and R. D. Fisher

W. S. HAMER, owner of 500-acre "Hurricane Hill" farm in Dyer County, Tenn., has proven that cottontail rabbits and bobwhite quail can be produced on a beef cattle farm.

"Hurricane Hill" is widely known for its fine registered Herefords. Hamer is an ardent sportsman, especially fond of quail hunting. He wanted to produce food and cover for birds and rabbits. But most of his acreage is devoted to improved pasture. Good management of pasture usually does not permit adequate food and cover for survival of game species.

When Hamer became a cooperator of the Dyer County Soil Conservation District in 1942, R. M. Wiley, SCS technician, helped him develop a complete conservation plan for the farm, including wildlife conservation. Hamer wanted to set aside a reasonable amount of land for bobwhite habitat. The questions were where, how much, and what kind of habitat?

Protecting wildlife areas from the cattle appeared difficult. SCS technicians suggested that fence rows could be planted to multiflora rose, but that wouldn't feed the bobwhites. Fortunately, "Hurricane Hill" was uniquely fenced. All cross fences were double, with spacings of 15 to 20 feet between them.

Hamer explained: "This was the only way I could keep my bulls where I wanted them. They could go through a single fence like no fence at all."

Since this double fence was desirable, Hamer agreed to rebuild the fences, spacing them 25 to 30 feet apart. A tentative plan was

Thomas Hamer and conservation officer Floyd C. Hurt standing by a 12-year old planting of multiflora rose on the Hamer farm.

Note:—The authors are, respectively, work unit conservationist, Dyersburg, Tenn., and area conservationist, Milan, Tenn., both of the Soil Conservation Service.

developed, calling for multiflora rose in the fence lines and bicolor lespedeza in between.

There were 12½ miles of double fences separating the farm into small pastures. It took thousands of rose and bicolor plants, which he obtained over a period of three years mainly from the Tennessee State Game and Fish Commission and commercial nurseries.

Hamer now has nothing but praise for "living fences." Annual fencepost replacements have been reduced from 2,500 to about 100. "That alone is a big saving," he said. "The rose fence is the most practical and economical fence of any kind for cattle—the cheapest fence you can build—even if you never had a bird or rabbit on your farm."

Rabbits responded quickly to the "briar patch" cover provided by the roses. Pasture grasses and clovers furnished their food. Bobwhites, however, did not increase the first three or four years. The cover and food apparently did not measure up to their requirements. As the plantings matured, however, the birds increased on the farm.

"I have 12 coveys all the time and 2 others that are on the farm part of the time," he said in 1960. "Before the rose and bicolor were planted I had one covey on the entire farm. Nongame birds have also increased. And rabbits are all over the place."

Hamer had hoped for a maximum of 20 coveys of quail, but he is delighted with 12—well above the average anywhere. He hunts the fence rows regularly with one man on each side of the fence.

He figures that his living fences take up about four acres per mile, and half of it should be charged to bobwhite management, the other half to the cottontails and his fencing needs. Thus, he is devoting 25 acres to the support of a dozen coveys of quail. Maintenance is negligible.

EXPLORING THE RIVER. By John and Jane Greverus Perry. 203 pp. Illus. 1960. McGraw-Hill Book Company, Inc.: New York. $3.50.

IN "Exploring the River," John and Jane Perry have done an exciting and timely job of introducing young readers to the concept of the natural community of a watershed. They help you to explore "Our River" from a spot of damp earth in the mountains to its mouth at the sea. You paddle a kayak and watch bird life along quiet tributary creeks. You learn why a farmer's well went dry. You navigate a power boat on the lower reaches and understand how pollution from silt and sewage affects the livelihood of oystermen. You observe tides and floods and come to know their cause. You delve into the wonders of the life cycle and discover how sun, air, soil, and water work together to make life possible. You find for yourself, as it were, the tragedy and waste of man's abuse of the land. You are left, as John and Jane intended, with a desire to protect these resources—and what is equally important, with some notion of what to do about it.

The Perrys are a knowledgeable and skillful writing pair who have combined sound facts and a zeal for conservation into a highly readable book. Aimed primarily at junior-high-school readers, it is informative and entertaining enough to captivate readers much older.

This book should be on the shelves of all school libraries. All elementary and high school teachers of social and biological sciences—especially those in city schools—should read it for both inspiration and a better understanding of the complexities of land use and its relationship to the natural and human resources in a watershed.

—D. HARPER SIMMS

NATURAL RESOURCE USE IN OUR ECONOMY. By William H. Stead. Study and Teaching Aids by George L. Fersch. 90 pp. Illus. Revised edition, 1960. Conservation and Resource-Use Education Project, Joint Council on Economic Education: New York. $1.25.

THIS pamphlet describes the present outlook for our resources and outlines the responsibility of government, business, and individual citizens. The text is written in nontechnical language and discusses the broad nature of our resource problems, involving renewable, nonrenewable, energy, and human resources. It is developed from a knowledge of the physical science aspects of resource use but is designed particularly to explain social science aspects of resource use. Charts based on information included in the President's Materials Policy Commission Report (Paley's Report) illustrate the United States' increasing consumption of resources, our growing dependence upon other countries, and the shifting of our Nation's energy sources.

A new section in this edition, "Generalized and Classroom Learning Activities," supplements the study guide questions which follow each chapter. This section is divided into understandings and activities for "Primary and Elementary" and "Junior and Senior High School" levels. Major conservation and resource-use concepts for teaching are defined and over 150 activities are described for teaching these concepts. Another useful feature of this edition is a double-page chart, "Teacher's Guide to Resource-Use."

—ADRIAN C. FOX

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THINGS TO DO IN SCIENCE AND CONVERVATION. By Byron L. Ashbaugh and Muriel Beuschlein. 163 pp. 1960. Interstate Printers and Publishers, Inc.: Danville, Ill. $2.50.

THE authors attempt in this handbook to develop a comprehensive understanding of the relationships between natural and manmade resources. They discuss important aspects of space and the solar system; air, water, soil, and minerals; and plant and animal life. They explain the why and how of such man-developed resources as electricity, synthetics, and nuclear energy. The book emphasizes "the drain imposed on the earth's resources by ever-increasing demands of modern civilization," and points out that the depletion of natural resources by larger populations is daily causing more complex and critical problems and obstacles.

The book was designed to help teachers develop improved subject material for instruction in science and conservation, and contains many diagrams and lists of steps to follow in conducting classroom demonstrations and experiments. It also would be a useful handbook for leaders of various youth organizations such as 4-H clubs and Boy and Girl Scouts—as well as a valuable addition to the family bookshelf.

—ALFRED E. BEATY

BIOCHEMISTRY OF PLANTS AND ANIMALS. By M. Frank Mallette, Paul M. Althouse, and Carl O. Clagett. 552 pp. Illus. 1960. John Wiley & Sons: New York. $8.50.

This book is an introductory text on biochemistry as applied to plants and animals. It is written primarily for undergraduate students, but it will be useful to others who are interested in biochemistry.

The authors, all of whom are in the Department of Agricultural and Biological Chemistry at Pennsylvania State University, have covered a wide variety of subjects in this phase of agricultural science.

The text consists of three major parts. The first deals with general biochemistry in which carbohydrates, proteins, lipides, enzymes, and energy relationships are discussed. Part 2 consists of information dealing with plant structure, metabolism, seed germination, nutrition, and growth. Animal biochemistry makes up part 3 with chapters dealing with body tissues, vitamins, minerals, feeds, digestion, metabolism, etc. A list of references is included at the end of each chapter.

In addition to the well-written material in the body of the text, a 15-page appendix contains useful information on the chemical composition of foods, and nutrient requirements of man as well as animals.

—B. D. BLAKELY

Employees of the Soil Conservation Service submitted 8,203 suggestions for improved procedures or techniques during fiscal year 1960. Of these, 207 suggestions resulted in $7,215 being paid to employees for tangible and intangible benefits that resulted in a savings of $45,842.71 to the Service.

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During the fiscal year 1960, the Soil Conservation Service assisted the Foreign Agricultural Service with the development of 147 new training programs for foreign nationals. These programs involved 334 people from 60 countries. Of these, 180 came as individuals, while 154 came in 15 groups of from 6 to 23 persons.

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